30-Day Launch Forecast

29 June 2000

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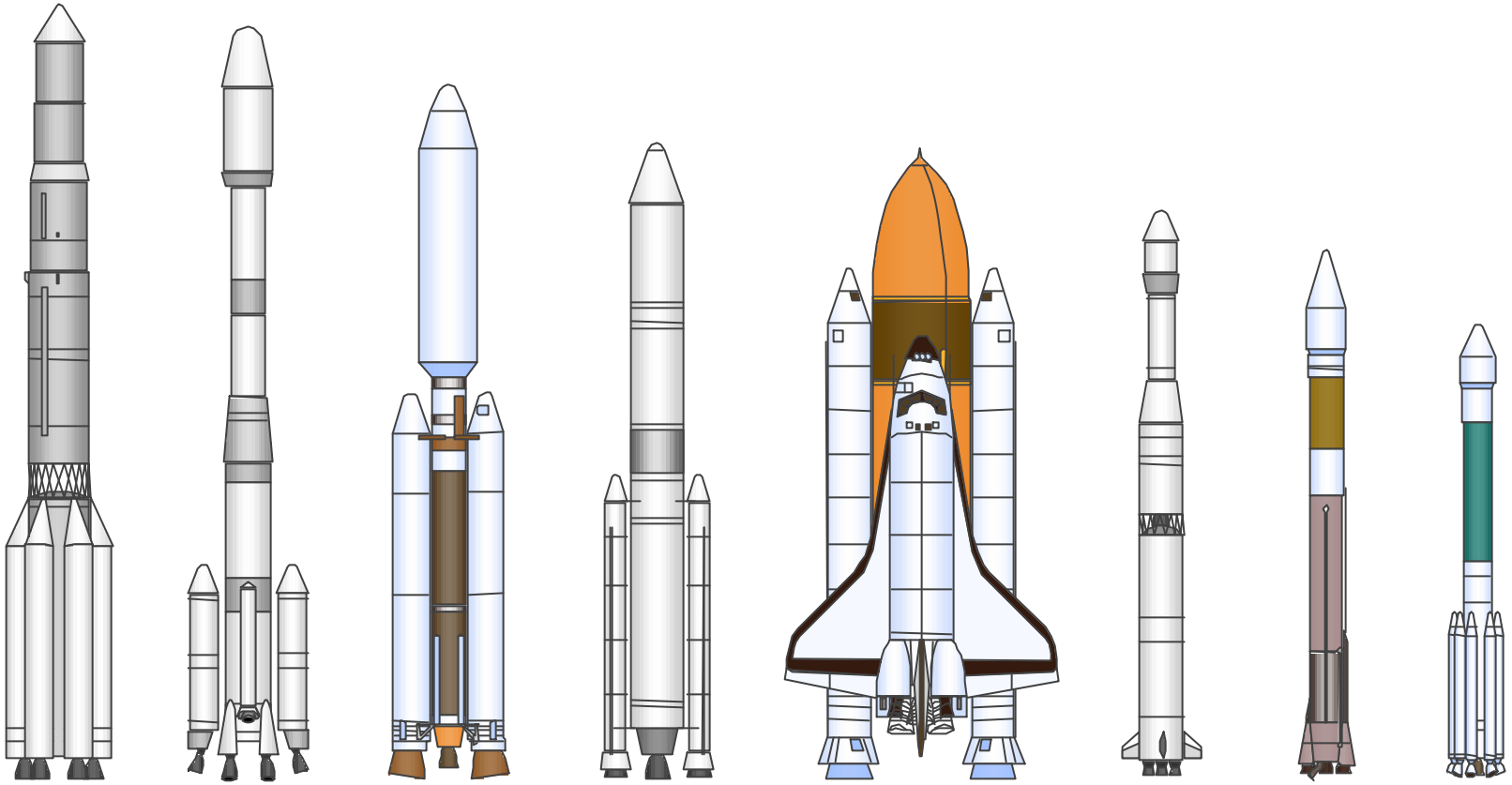
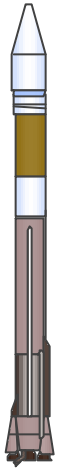


30-Day Launch Forecast
(29 June 2000 - 28 July 2000)

Mon	Tue	Wed	Thu	Fri	Sat	Sun	Comments / Schedule Changes
A Look Ahead 31 Jul — Titan 4B — NRO 02 Aug — Soyuz-U — Progress M1 09 Aug — Soyuz-Fregat — Cluster-2 23 Aug — Delta 3 — dummy 25 Aug — Dnepr — Saudisat 1-A & 1-B 29 Aug — Titan 2 — NOAA-L All foreign launches presented in this forecast are unofficial			29	30 Atlas 2A TDRS-H SLC-36A CCAFS 0838-0918 EDT	1 Jul Proton Sirius-1 Baikonur 1808 EDT	2	Atlas 2A / TDRS-H; Flight AC-139 • Tracking and Data Relay Satellite Proton / Sirius-1 • Satellite-to-car radio broadcast system • Formerly known as CD Radio Proton / Geyser • Russian military data relay satellite
3	4 Proton Geyser Baikonur 1940 EDT	5	6	7 Minuteman II IFT-5 LF-03 VAFB 2201-0201 EDT	8	9	Minuteman II / Intercept Flight Test (IFT)-5 • Missile defense test Proton / Zvezda Service Module; ISS Flight 1R • Second Russian component of the International Space Station (ISS) Soyuz-Fregat / Cluster-2 • First two of four identically instrumented science satellites sponsored by ESA
10	11 Proton Zvezda Baikonur 0102 EDT	12 Soyuz-Fregat Cluster-2 Baikonur TBD EDT	13	14 Atlas 2AS EchoStar-6 SLC-36B CCAFS 0121-0320 EDT	15 Kosmos 3M CHAMP MITA Plesetsk TBD EDT	16 Delta 2 GPS IIR-5 SLC-17A CCAFS 0517-0544 EDT	Atlas 2AS / EchoStar-6 • 6th DBS satellite for the EchoStar Com. Corp. • System broadcasts for the Digital Sky Highway (DISH) Kosmos 3M / CHAMP / MITA / BIRD • CHAMP: Challenging Mini-Satellite Payload for Geophysical Research and Application (German) • MITA: Mini-satellite Italiano a Tecnologia Avanzata (Italian) • BIRD: Bispectral Infrared Detection microsatellite (German)
17	18	19 Minotaur MightySat II.1 SLC-6 VAFB 1609-1735 EDT	20	21	22	23	Delta 2 (7925) / GPS IIR-5; Flight 279 • NAVSTAR Global Positioning System Minotaur / MightySat II.1 • Orbital/Suborbital Launch Vehicle • Air Force Research Laboratory (AFRL) multi-mission, small satellite program
24	25 Ariane 5 Astra-2B/ GE-7 ELA-3 CSG TBD EDT	26	27 Sea Launch PAS-9 Launch Platform 1846 EDT	28	**Last Week's Launch Activities** Date — Vehicle — Payload — Site — Type 24 Jun — Proton — Express-3A — Baikonur — Communications 25 Jun — Long March 3 — Fengyun-2B — Xichang — Meteorological 28 Jun — Kosmos 3M — Nadezhda/ Tsinghua-1/ SNAP-1 — Plesetsk — Navigation / Remote Sensing / Technology Demo Launch Date provided in Universal Time		

Acronyms: VAFB - Vandenberg AFB CA; CCAFS - Cape Canaveral AFS FL; KSC - Kennedy Space Center FL; EAFB - Edwards AFB CA; NET - No Earlier Than; WFF - Wallops Flight Facility; SLC - Space Launch Complex; LC- Launch Complex; LF - Launch Facility; EDT - Eastern Daylight Time; EST - Eastern Standard Time; CSG - Guiana Space Center

Atlas 2A



Current Mission Specifics

301st space launch of the Atlas vehicle

Reliability History

- **Atlas: 275 successes in 300 attempts**
- **Atlas 2 / 2A / 2AS: 47 successes in 47 attempts**

Typical Launch Sequence

• Booster Sustainer Ignition	0	sec
• Booster Engine Cutoff	165	sec
• Booster Package Jettison	168	sec
• Payload Fairing Jettison	228	sec
• Sustainer Engine Cutoff	274	sec
• Atlas/Centaur Separation	278	sec
• Centaur Main Engine Start (#1)	295	sec
• Centaur Main Engine Cutoff (#1)	581	sec
• Centaur Main Engine Start (#2)	1,494	sec
• Centaur Main Engine Cutoff (#2)	1,581	sec
• Spacecraft Separation	1,808	sec

Payload weight: TDRS-H; 3,675 lb (at launch)

Orbit: 120 nm x 13,000 nm GTO

Next Atlas 2 series (2A or 2AS) launch

- **14 July 2000 / Atlas 2AS / EchoStar-6**

Background Information

First Launch:	**June 1992**
Flight Rate:	**4-6 per year**
Launch Site:	**SLC-36A & SLC-36B (CCAFS, USA); SLC-3E (VAFB, USA)**
Capability:	**16,130 lb to LEO; 6,760 lb to GTO (medium fairing)**

History

- **Started in 1950s as Air Force ICBM.**
- **Modified in 1960s for space launches.**
- **Cryogenic Centaur upper stage first launched in 1962.**
- **Atlas 2 is an uprated version of the Atlas 1.**
- **Atlas 2A uses upgraded Centaur with RL10A-4 engines.**

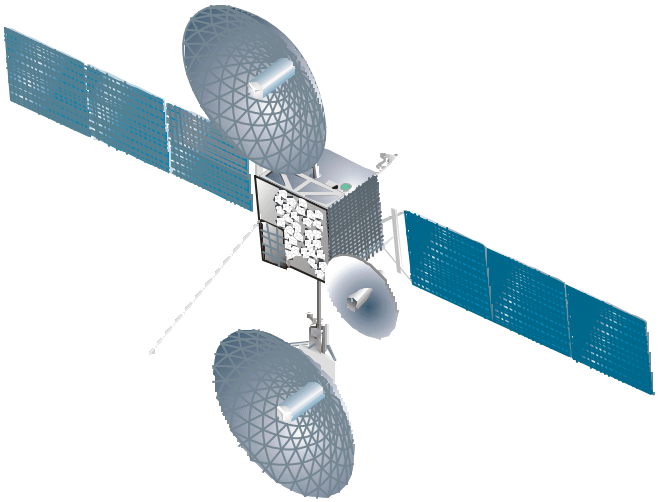
Description

- **Two and a half stage vehicle.**
- **Stage 1 consists of two Rocketdyne MA-5A booster engines plus one sustainer engine burning LOX/RP-1 fed from stage 1 tanks, generating a total of 485,775 lb of thrust.**
- **Stage 2 (Centaur D-1A) uses two Pratt & Whitney RL10A-4 engines that burn LH_2/LOX, generating a total of 41,600 lb of thrust.**

Profile

Length:	**156 ft**	**Launch Weight:**	**413,275 lb**
Diameter:	**10 ft**	**Liftoff Thrust:**	**485,775 lb**
Payload Fairing:	**34 x 11 ft (Medium); 40 x 13.8 ft (Long); 43 x 13.8 ft (Extended)**		

TDRS-H



Spacecraft Specifications

Payload Weight:

- **3,675 lb (at launch)**
- **2,909 lb (dry mass)**

Dimensions:

- **Length: 43.4 ft**
- **Solar Arrays: 68.8 ft**

Tracking and Data Relay Satellite (TDRS) H

First of a trio of spacecraft to replace NASA's current TDRS constellation and serve as the sole means of continuous, high-data-rate communication with the space shuttle, the International Space Station, and dozens of unmanned scientific satellites in low earth orbit.

Mission

Support manned missions, science data missions including Hubble Space Telescope, and satellite data dumps.

Description

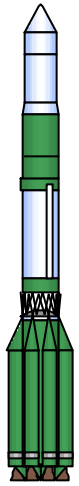
Spacecraft Description:

- **3-axis, body-stabilized HS-601 bus.**
- **S-Band Single Access: two 15-foot diameter mechanically steerable antennas provide high gain support to satellites with low gain antennas.**
- **Ku-Band Single Access: higher bandwidth (13.7-15.0 GHz) supporting high-resolution digital television including all space shuttle video communications; data at rates of up to 300 Mbps.**
- **Ka-Band Single Access: tunable, wideband, high frequency (22.5-27.5 GHz) service provides the capability of data rates up to 800 Mbps; Ka-Band frequency establishes interoperability with international community such as the Europeans and Japanese.**
- **Power: 2,300 W (EOL) provided by two wings covered with silicon solar cells; NiH_2 batteries supply power during eclipses.**
- **Design life: 15 years.**

Orbit: 120 nm x 13,000 nm GTO

Prime Contractor: Hughes Space & Communications

Proton



Current Mission Specifics

195th launch of the Proton since 1980

Reliability History (Since 1980)

- **182 successes in 194 attempts**

Typical Launch Sequence

• Stage 1 Ignition (10% thrust)	-10.0 sec
• Stage 1 thrust 100%	0.0 sec
• Liftoff	0.57 sec
• Stage 2 ignition	116.91 sec
• Stage 1/2 separation	121.11 sec
• Stage 3 vernier ignition	330.0 sec
• Stage 2 shutdown	332.7 sec
• Stage 2/3 separation	333.4 sec
• Stage 3 main ignition	335.8 sec
• PLF jettison	351.0 sec
• Stage 3 main engine S/D	567.11 sec
• Stage 3/4 separation	582.01 sec
• Block 4 orbit insertion events	TBD

Payload weight: Sirius-1; 7,055 lb (BOL)

Orbit: Inclined elliptical orbit; 60° or more elevation

Next Proton launch:

- **4 July 2000 / Geyser**

Background Information

First Launch:	**July 1965**
Flight Rate:	**13 per year (maximum recorded launch rate)**
Launch Site:	**Baikonur, Kazakhstan**
Capability:	**44,100 lb to LEO; 10,580 lb to GTO; 5,730 lb to GEO**

History

- **Originally intended as a ballistic missile but converted to a space launch vehicle during development.**
- **Two, three, and four-stage versions were developed.**
- **Integrated by the Khrunichev state space center.**
- **Used to launch satellites into GEO, interplanetary spacecraft, and manned space stations such as Salyut and Mir.**

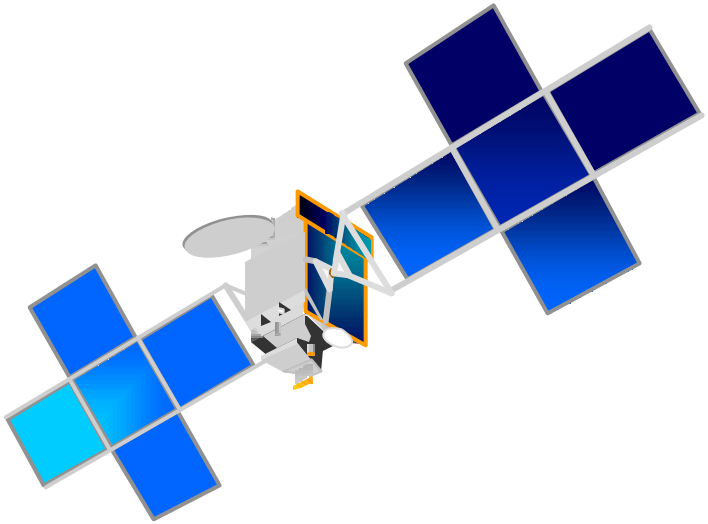
Description

- **Three (SL-13) or four-stage (SL-12) liquid-fueled vehicle.**
- **Stage 1 has six strap-on boosters with RD-253 engines burning N_2O_4 fed from the core stage 1 tank with UDMH fuel carried in the strap-on tanks, generating a total of 1,980,000 lb of thrust.**
- **Stage 2 has four RD-0210 sustainer engines burning N_2O_4/UDMH fed from stage 2 tank, generating a total of 534,600 lb of thrust.**
- **Stage 3 has one RD-0210 engine with four verniers burning N_2O_4/UDMH, generating a total thrust of 140,650 lb.**
- **Stage 4 Block DM has one restartable RD-58 burning LOX/kerosene, generating a total thrust of 19,125 lb.**
- **Proton M uses Breeze M Stage 4 with single fixed restartable DB Khimmash engine burning N_2O_4/UDMH, generating 4,415 lb of thrust.**

Profile

Length:	**189.5 ft**	**Launch Weight:**	**1,521,175 lb**
Diameter:	**24.3 ft**	**Liftoff Thrust:**	**1,980,000 lb**
Payload Fairing:	**32.8 ft x 14.3 ft**		

Sirius-1



Spacecraft Specifications

Weight:

- **7,055 lb (at launch)**
- **6,173 lb (on orbit)**

Dimensions:

- **Solar Arrays: 102.6 ft**

Sirius-1 (formerly CD Radio)

First of three satellites for the Sirius Satellite Radio digital system that will broadcast music and entertainment programming to motorists throughout the continental United States. Sirius plans to offer 100 channels of commercial-free music, news, sports and entertainment programming for a monthly subscription fee.

Mission

Satellite-to-car, CD-quality, radio broadcast system for the continental United States.

Description

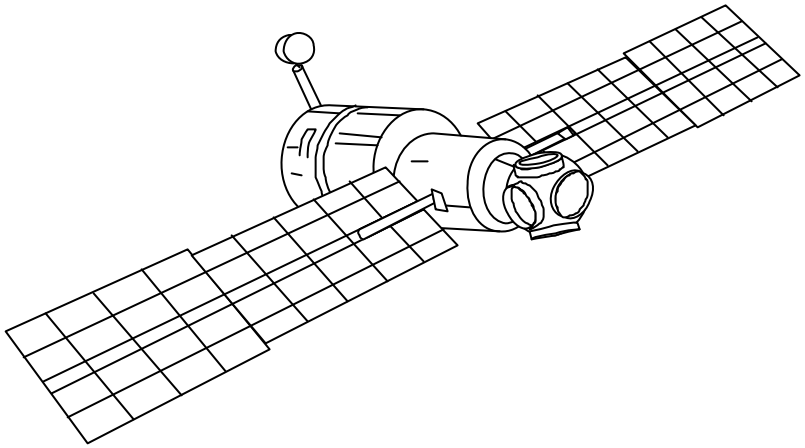
Spacecraft Description:

- **3-axis stabilized FS-1300 bus.**
- **One 120 W TWTA S-band channel; 12.5 MHz channel bandwidth; 2320-2332.5 MHz downlink frequency bands; max EIRP 62.0 dBW; LHCP.**
- **Power: 8,000 Watts (EOL); NiH_2 batteries for eclipse protection.**
- **Design life: 15 years.**

Orbit: Inclined elliptical orbit; 60° or more elevation

Prime Contractor: Space Systems/Loral

Zvezda Service Module (ISS)



Spacecraft Specifications

Payload Weight:

- **42,000 lb (at launch)**

Dimensions:

- **Length: 43 ft**
- **Solar Arrays: 97.5 ft**

Zvezda (“Star”)

The Zvezda Service Module will be the first fully Russian contribution to the International Space Station and will serve as the early cornerstone for the first human habitation of the station. It will function as the primary docking port for Progress-type cargo resupply vehicles, and provide propulsive attitude control and reboost capability for the early station.

Mission

The mission of the International Space Station is to create a permanent orbiting science institute in space capable of performing long-duration research in the materials and life sciences areas in a nearly gravity-free environment, and to enable the long-term exploration of space for the benefit of people on Earth.

Description

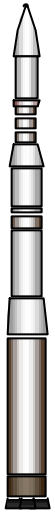
Spacecraft Description:

- **Four docking ports for Progress and Soyuz resupply ships.**
- **Three pressurized compartments: a small, spherical Transfer Compartment at the forward end; the long, cylindrical main Work Compartment; and the small, cylindrical Transfer Chamber at the aft end.**
- **Unpressurized Assembly Compartment is wrapped around the exterior of the Transfer Chamber at the aft of the module; holds external equipment such as propellant tanks, thrusters and communications antennas.**
- **Design life: 15 years.**

Orbit: 210 nm circular, 51.6° inclination

Prime Contractor: Khrunichev State Research and Production Center

Minuteman II



Current Mission Specifics

6th launch of the Minuteman II IFT Program

Reliability History (IFT Program only)

- **5 successes in 5 attempts**

Typical Launch Sequence

- **N/A**

Payload Weight: N/A

Orbit: N/A

Next Minuteman II launch

- **6 September 2000 / IFT-6**

Background Information

First Launch:	**1961**
Flight Rate:	**TBD**
Launch Site:	**VAFB, USA and CCAF, USA**
Capability:	**300 LB to Polar Orbit**

History

- **Minuteman ICBM began launching in early 1960's.**
- **450 ICBM missiles are being retired with a 20 year 98% success rate.**
- **Use of these boosters is consistent with Strategic Arms Reduction Treaty (START) and Missile Technology Control Regime (MTCR) guidelines.**
- **Rocket System Launch Program (RSLP) received it's SECDEF charter in 1972.**
- **Minuteman will be operational beyond 2010.**

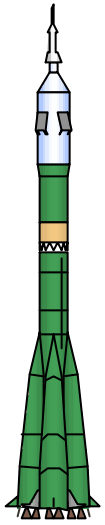
Description

- **Three-stage Minuteman ICBM launched above ground.**
- **Contains a Velocity Control System to circularize orbit and provide final attitude control.**
- **Stage 1 Thiokol solid rocket motor generating 178,200 lb of thrust.**
- **Stage 2 Aerojet Solid rocket motor generating 60,300 lb of thrust.**
- **Stage 3 United Technologies solid rocket motor generates 34,200 lb thrust.**

Profile

Length:	**72 ft**	**Launch Weight:**	**75,400 lb**
Diameter:	**5.5 ft**	**Liftoff Thrust:**	**178,200 lb**
Payload Fairing:	**12.5 x 3.3 ft**		

Soyuz-Fregat



Background Information

First Launch:	**November 1963**
Flight Rate:	**45 per year (maximum recorded launch rate)**
Launch Site:	**Plesetsk, Russia; Baikonur, Kazakhstan**
Capability:	**15,400 lb to LEO; 5,500 lb to 760 nm circular, 51.8° orbit (with Ikar)**

History

- **Developed from the Vostok Launch Vehicle originally derived from the SS-6 (Sapwood) ICBM.**
- **Used to launch every former Soviet Union piloted spacecraft since 1964.**
- **Also used to launch photo reconnaissance satellites, earth resource satellites, and Progress resupply missions to the Mir space station.**
- **Starsem, a joint European/Russian venture, formed in 1996 to market Soyuz-Fregat, a commercial version of Soyuz.**

Current Mission Specifics

550th launch of a Soyuz Launch Vehicle since 1980

Reliability History (since 1980)

- **536 successes in 549 attempts**

Typical Launch Sequence

Lift off	**0 sec**
Strap-ons separate	**118 sec**
Payload fairing jettison	**160 sec**
Core stage 1 separation	**286 sec**
Orbit Injection	**540 sec**

Payload Weight: Cluster-2; 5,290 lb (total at launch)

Orbit: Highly eccentric polar orbits ranging from 13,510 to 67,555 nm at 64.8° - 90° inclination

Next Soyuz launch

- **2 August 2000 / Progress M1 (ISS)**

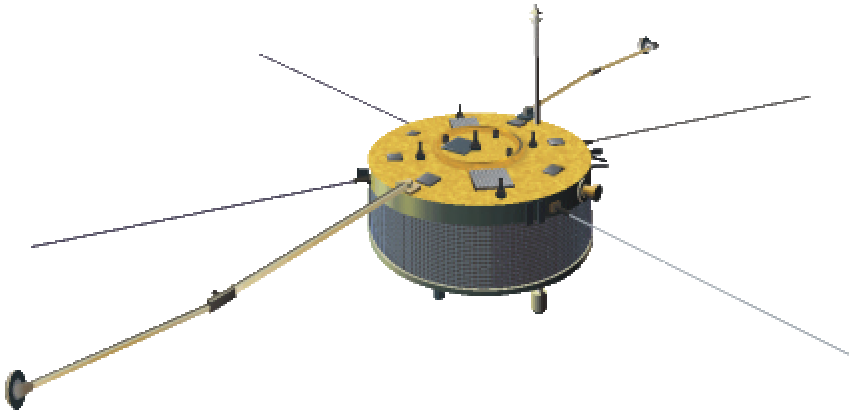
Description

- **Two-stage (plus 4 strap-ons) liquid fueled vehicle.**
- **Stage 1 core has one RD-108 booster engine (one turbopump with four separate combustion chambers) burning LOX/kerosene fed from stage 1 tanks, generating 220,050 lb of thrust.**
- **Four Stage 1 strap-ons each have one RD-107 engine (one turbopump with four separate combustion chambers) burning LOX/kerosene fed from stage 1 tank, generating a total of 227,925 lb of thrust each.**
- **Stage 2 has one RD-0110 Block 1 engine burning LOX/kerosene, generating 67,050 lb of thrust.**
- **Starsem version only: Fregat restartable upper stage powered by a single-chamber Lavochkin engine engine burning UDMH/N_2O_4, generating 4,410 lb of vacuum thrust.**

Profile

Length:	**162.5 ft**	**Launch Weight:**	**682,765 lb**
Diameter:	**33.8 ft**	**Liftoff Thrust:**	**1,334,700 lb**
Payload Fairing:	**37.3 ft x 9.8 ft**		

Cluster II



Cluster II

First pair of four identical satellites that will fly in formation. Cluster II is one of ESA's top priority Cornerstone science missions, and replaces the original Cluster mission that was destroyed during the failed maiden launch of the Ariane 5 rocket in June 1996.

Mission

Study the interaction between the the solar wind and the Earth's magnetosphere allowing for the first time truly three-dimensional measurements of both large- and small-scale phenomena in the near-Earth environment.

Description

Spacecraft Description:

- **Spin-stabilized cylindrical bus; orbit/attitude maintenance performed by semi-radial and axial control thrusters together with the main engine.**
- **Each satellite carries an identical set of 11 instruments mounted to the Main Equipment Platform.**
- **Power: 224 W provided by six curved solar-array panels; five 80 Ah Silver Cadmium batteries provide eclipse protection.**
- **Carries two 5 meter-long experiment booms, four 50 meter-long wire booms, and two antenna booms.**
- **Telemetry downlink bit rate 2 to 262 kbit/s.**
- **Design life: 2 years.**

Orbit: **Highly eccentric polar orbits ranging from 13,510 to 67,555 nm at 64.8° - 90° inclination**

Prime Contractor: Dornier

Spacecraft Specifications

Weight:

- **2,645 lb (at launch)**
- **1,213 lb (dry mass)**

Dimensions:

- **Height:** **4.3 ft**
- **Diameter:** **9.5 ft**

Space Launch Activities
2000 Year To Date

United States Launches

Date	Vehicle	Payload	Site	Type
18 Jan	Minuteman II	IFT-4	VAFB, LF-03	Missile Defense (MIL)
21 Jan	Atlas 2A	DSCS-B8	CCAFS, SLC-36A	Communications (MIL)
27 Jan	Minotaur	JAWSAT	VAFB, SLC-7	Technology Demo (MIL)
03 Feb	Atlas 2AS	Hispasat 1-C	CCAFS, SLC-36B	Communications (COM)
08 Feb	Delta 2	Globalstar-14	CCAFS, SLC-17B	Communications (COM)
11 Feb	STS-99	SRTM	KSC, LC-39A	Radar Mapping (CIV)
08 Mar	Peacekeeper	GT-29-PA	VAFB, LF-05	FOT&E (MIL)
12 Mar	Taurus	MTI	VAFB, 576-E	Technology Demo (MIL)
12 Mar*	Sea Launch	ICO F-1	Pacific Ocean	Communications (COM)
25 Mar	Delta 2	IMAGE	VAFB, SLC-2W	Science (CIV)
03 May	Atlas 2A	GOES-L	CCAFS, SLC-36A	Meteorology (CIV)
08 May	Titan 4B	DSP-20	CCAFS, SLC-40	Early Warning (MIL)
11 May	Delta 2	GPS IIR-4	CCAFS, SLC-17A	Navigation (MIL)
19 May	STS-101	ISS 2A.2a	KSC, LC-39A	ISS Resupply (CIV)
24 May	Minuteman III	FTM-02	VAFB, LF-09	Flight Test Missile (MIL)
24 May	Atlas 3A	Eutelsat-W4	CCAFS, SLC-36B	Communications (COM)
07 Jun	Pegasus XL	TSX-5	VAFB	Science (MIL)
09 Jun	Minuteman III	GT-172-GM	VAFB, LF-10	FOT&E (MIL)

French Launches

Date	Vehicle	Payload	Site	Type
25 Jan	Ariane 42L	Galaxy-10R	CSG, ELA-2	Communications (COM)
18 Feb	Ariane 44LP	SUPERBIRD-4	CSG, ELA-2	Communications (COM)
21 Mar	Ariane 505	INSAT-3B/ AsiaStar	CSG, ELA-3	Communications (COM) Communications (COM)
19 Apr	Ariane 42L	Galaxy 4-R	CSG, ELA-2	Communications (COM)

Chinese Launches

Date	Vehicle	Payload	Site	Type
25 Jan	LM 3A	Zhongxing-22	Xichang	Communications (CIV)
25 Jun	LM 3	Fengyun-2B	Xichang	Meteorological (CIV)

Indian Launches

Date	Vehicle	Payload	Site	Type
No Launches to Date				

Japanese Launches

Date	Vehicle	Payload	Site	Type
10 Feb*	M-5	ASTRO-E	Kagoshima	Science (CIV)

Brazilian Launches

Date	Vehicle	Payload	Site	Type
No Launches to Date				

* Indicates Launch Failure
Launch Date provided in Universal Time

Space Launch Activities
2000 Year To Date

Russian Launches

Date	Vehicle	Payload	Site	Type
01 Feb	Soyuz-U	Progress M1-1	Baikonur	Mir Resupply (CIV)
03 Feb	Zenit 2	Cosmos 2369	Baikonur	Signal Intelligence (MIL)
08 Feb	Soyuz-Fregat	IRDT	Baikonur	Technology Demo (COM)
12 Feb	Proton	Garuda-1	Baikonur	Communications (COM)
12 Mar	Proton	Express-6A	Baikonur	Communications (CIV)
20 Mar	Soyuz-Fregat	Dumsat	Baikonur	Technology Demo (COM)
04 Apr	Soyuz-U	Soyuz TM-30	Baikonur	Mir Resupply (CIV)
17 Apr	Proton	SESat	Baikonur	Communications (COM)
25 Apr	Soyuz-U	Progress M1-2	Baikonur	Mir Resupply (CIV)
03 May	Soyuz-U	Cosmos 2370	Baikonur	Classified (MIL)
16 May	Eurockot	SIMSAT-1 & -2	Plesetsk	Demo Flight (COM)
06 Jun	Proton	Gorizont-45	Baikonur	Communications (CIV)
24 Jun	Proton	Express-3A	Baikonur	Communications (CIV)
28 Jun	Kosmos 3M	Nadezhda/ Tsinghua-1/ SNAP-1	Plesetsk	Navigation (CIV) Remote Sensing (CIV) Technology Demo (CIV)

Launch Market Analysis

By Country

	# of Launches	Percent of Market
US	9	30.0%
Russia	14	46.7%
France	4	13.3%
China	2	6.7%
Japan	1	3.3%

By Mission

	# of Launches	Percent of Market
US Military	3	10.0%
US Civil	2	6.7%
US Commercial	4	13.3%
World Military	2	7.4%
World Civil	10	33.3%
World Commercial	9	30.0%

By Orbit Type (Commercial Only)

GEO	# of Launches	Percent of Market
US	2	25.0%
Russia	2	25.0%
France	4	50.0%
China	0	0.0%
Japan	0	0.0%

LEO	# of Launches	Percent of Market
US	2	40.0%
Russia	3	60.0%
France	0	0.0%
China	0	0.0%
Japan	0	0.0%

Figures Do Not Include US Space Shuttle, Small Launch Vehicles, or ICBM launches

* Indicates Launch Failure
Launch Date provided in Universal Time